

The Land-Sea Connection

Central Coast Long-term Environmental Assessment Network

City of Santa Cruz

City of Watsonville (Lead Agency)

Moss Landing Power Plant

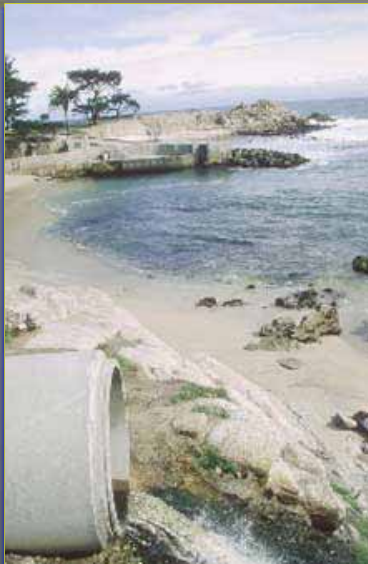
Monterey Regional Water Pollution Control Agency

Carmel Area Wastewater District

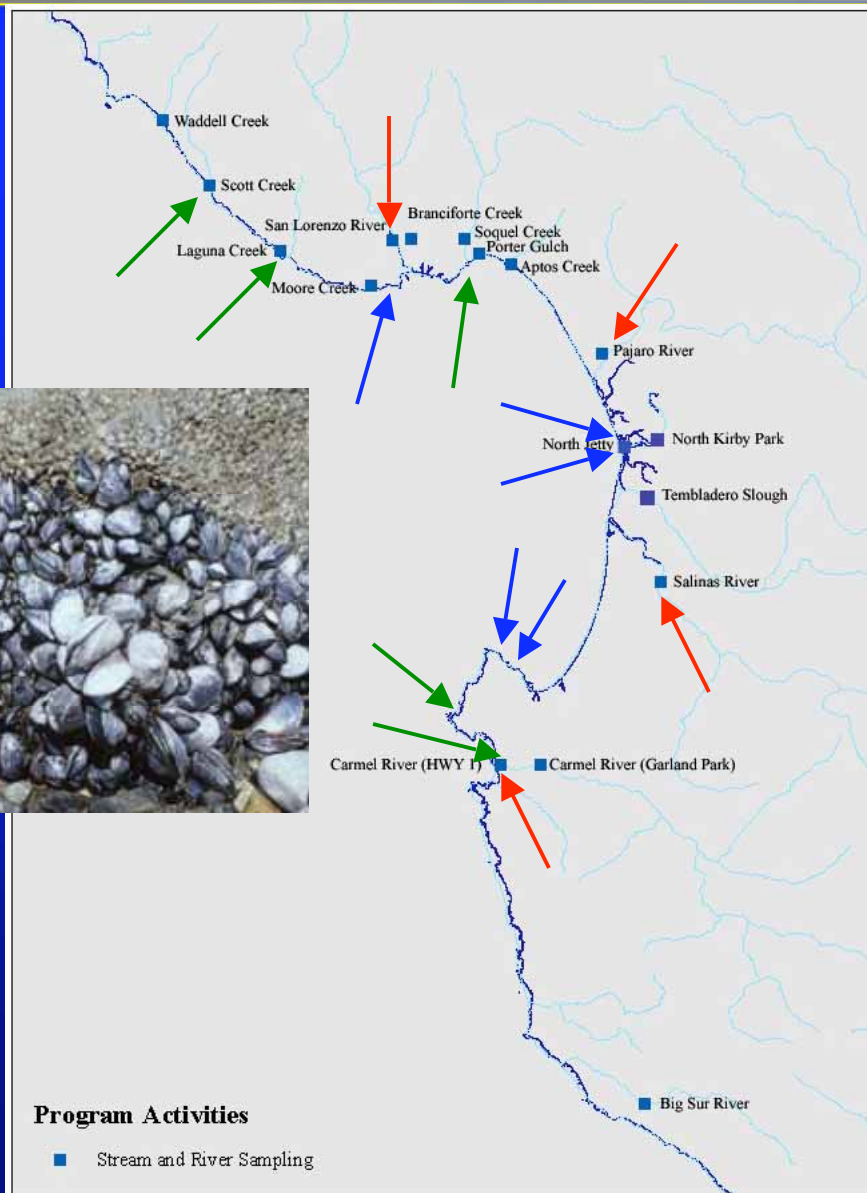
Central Coast Regional Water Quality Control Board

National Status and Trends Mussel Watch Program

National Oceanic and Atmospheric Administration



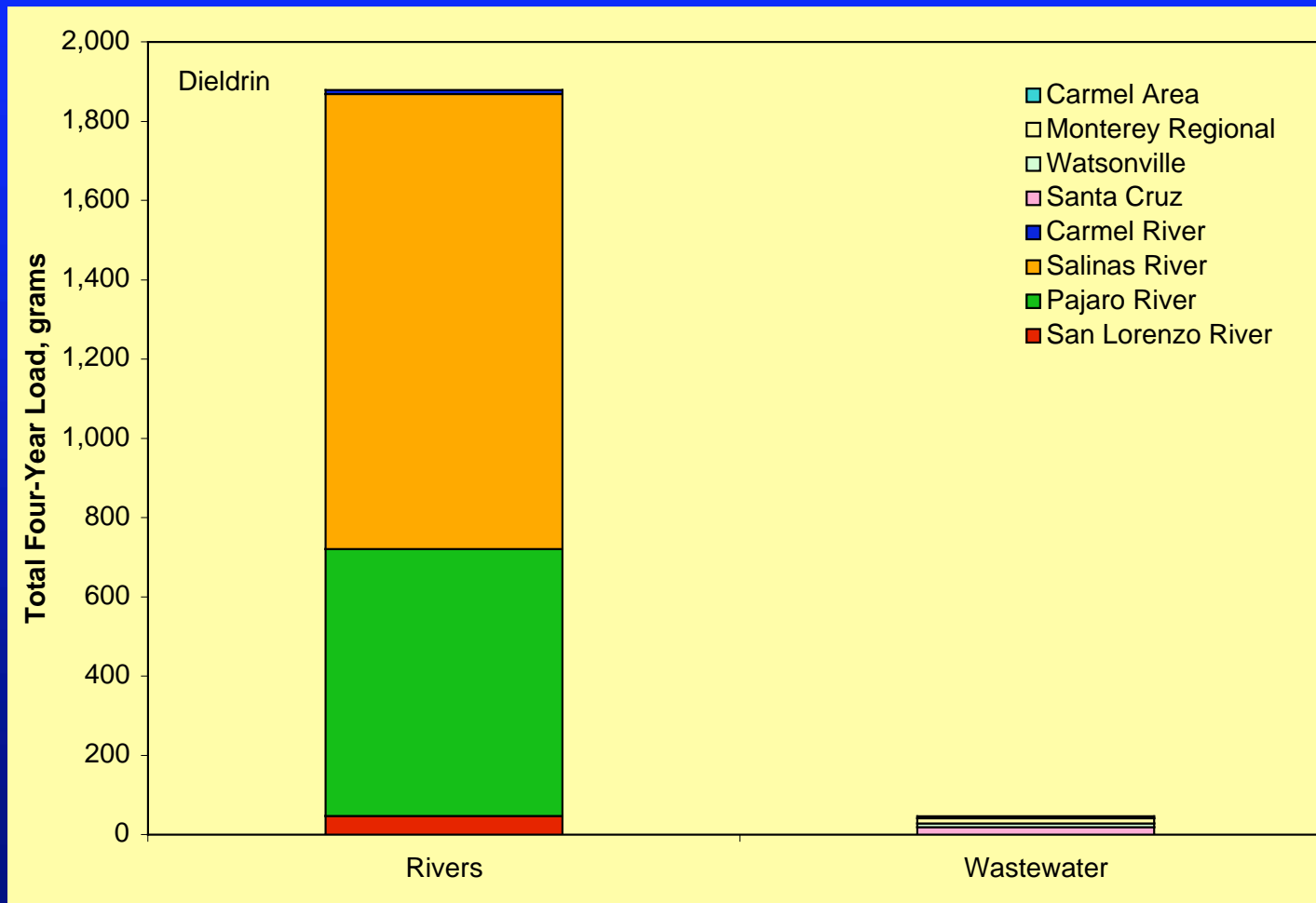
Monterey Bay



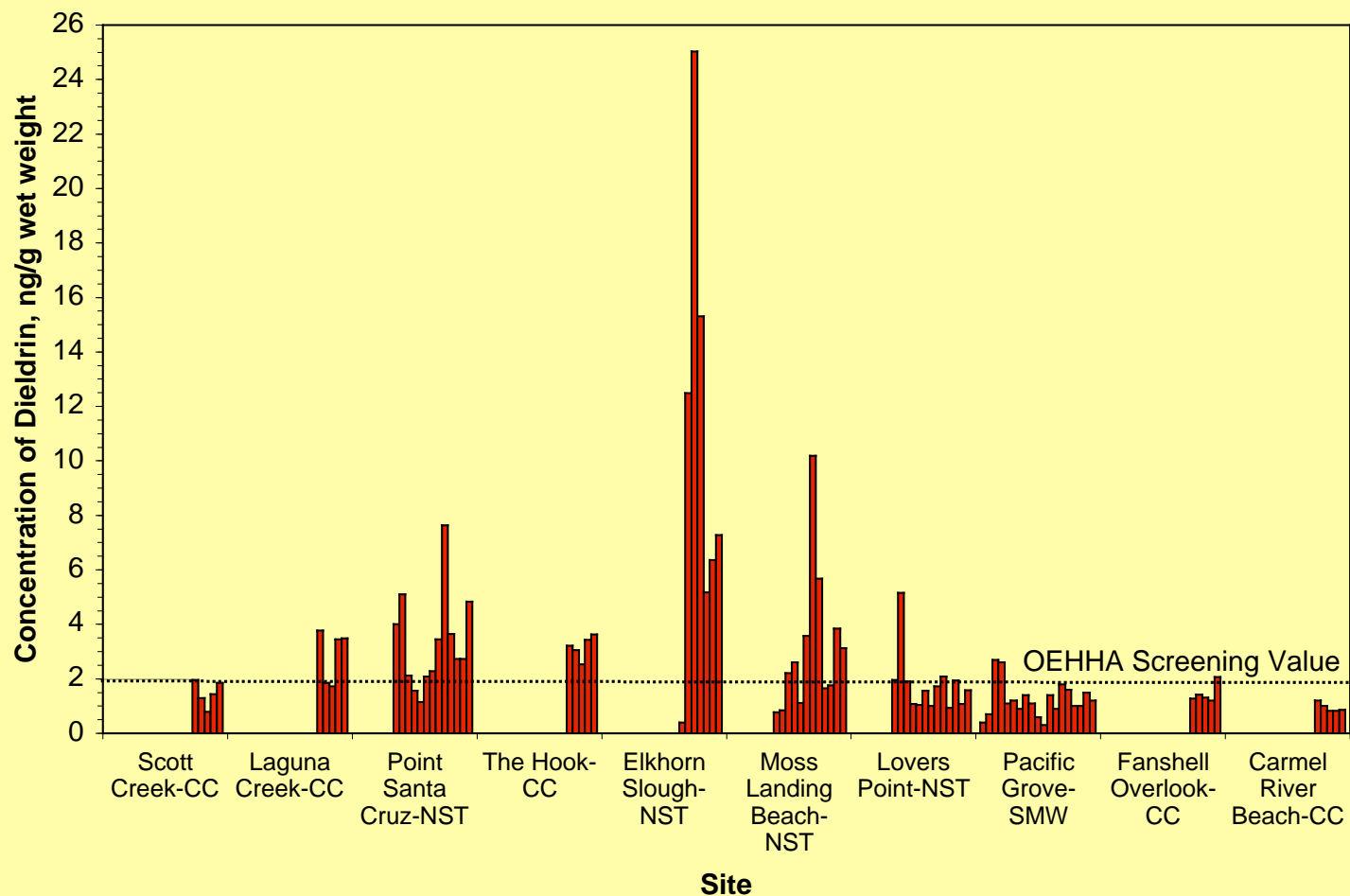
Data Collection

- Rivers - 30-day flow-proportioned samples in the wet and dry seasons
 - Persistent Organic Pollutants
- Mussels - Composite samples of resident animals
 - Persistent Organic Pollutants

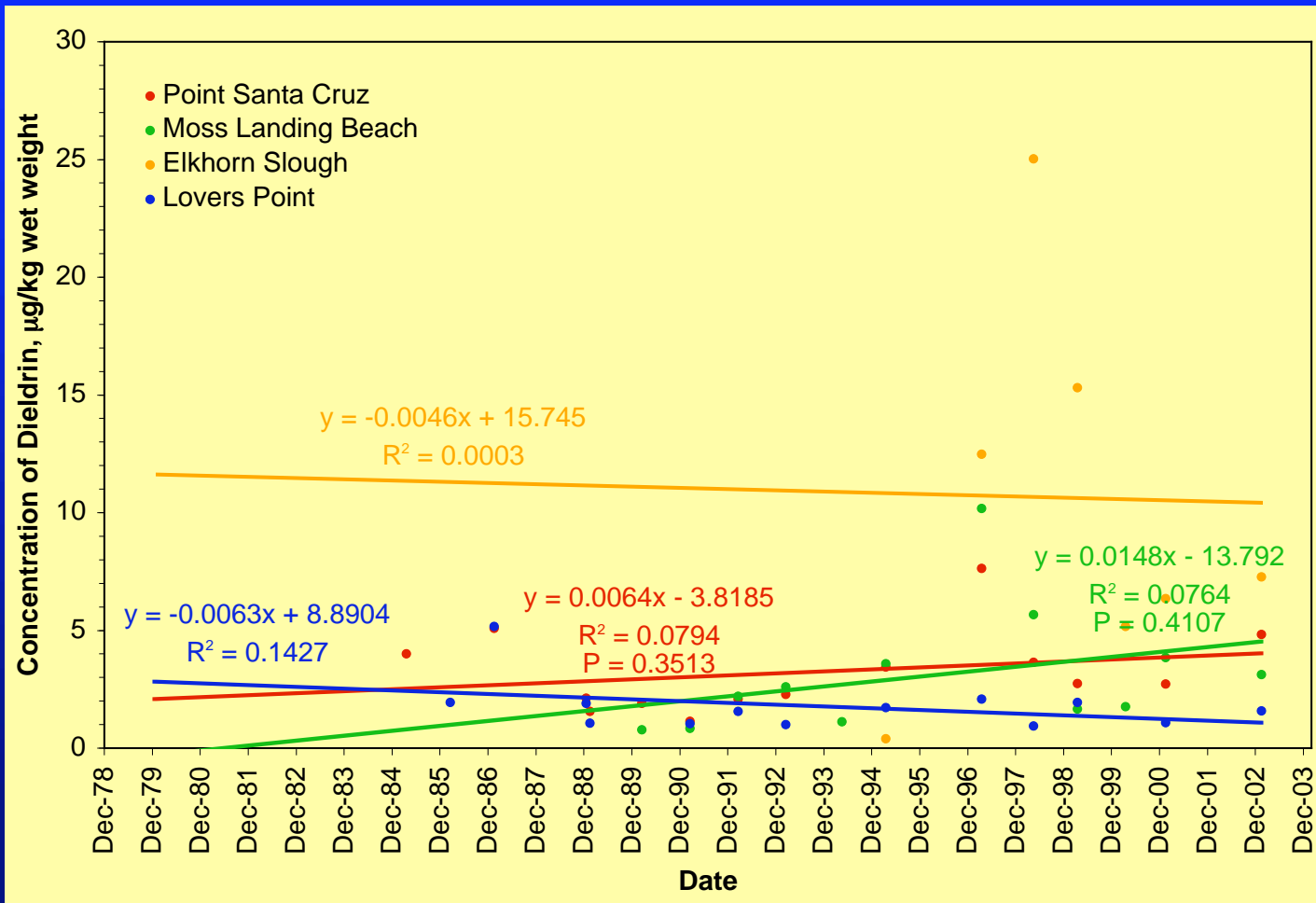
Dieldrin Sources and Loads



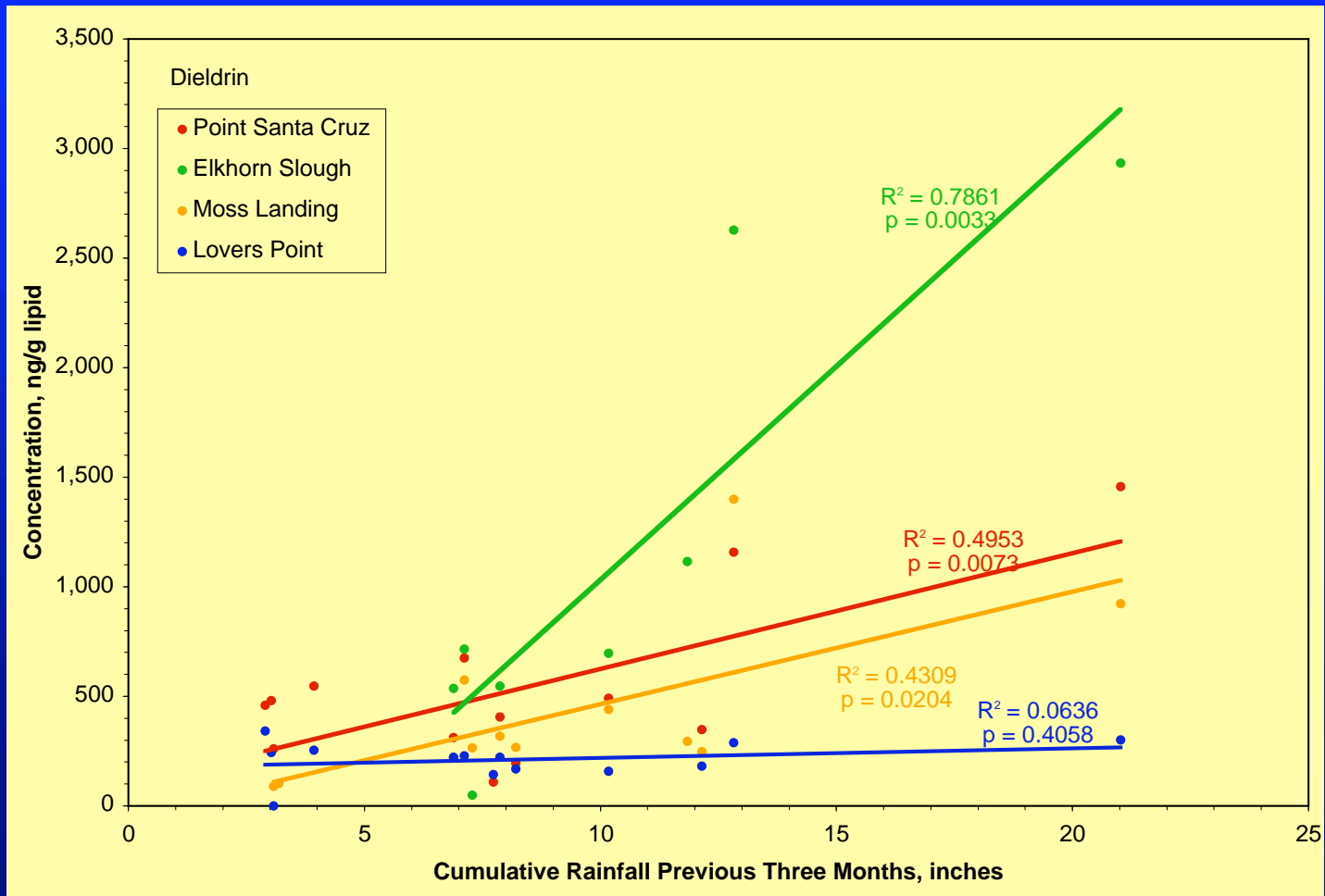
Dieldrin in Mussels



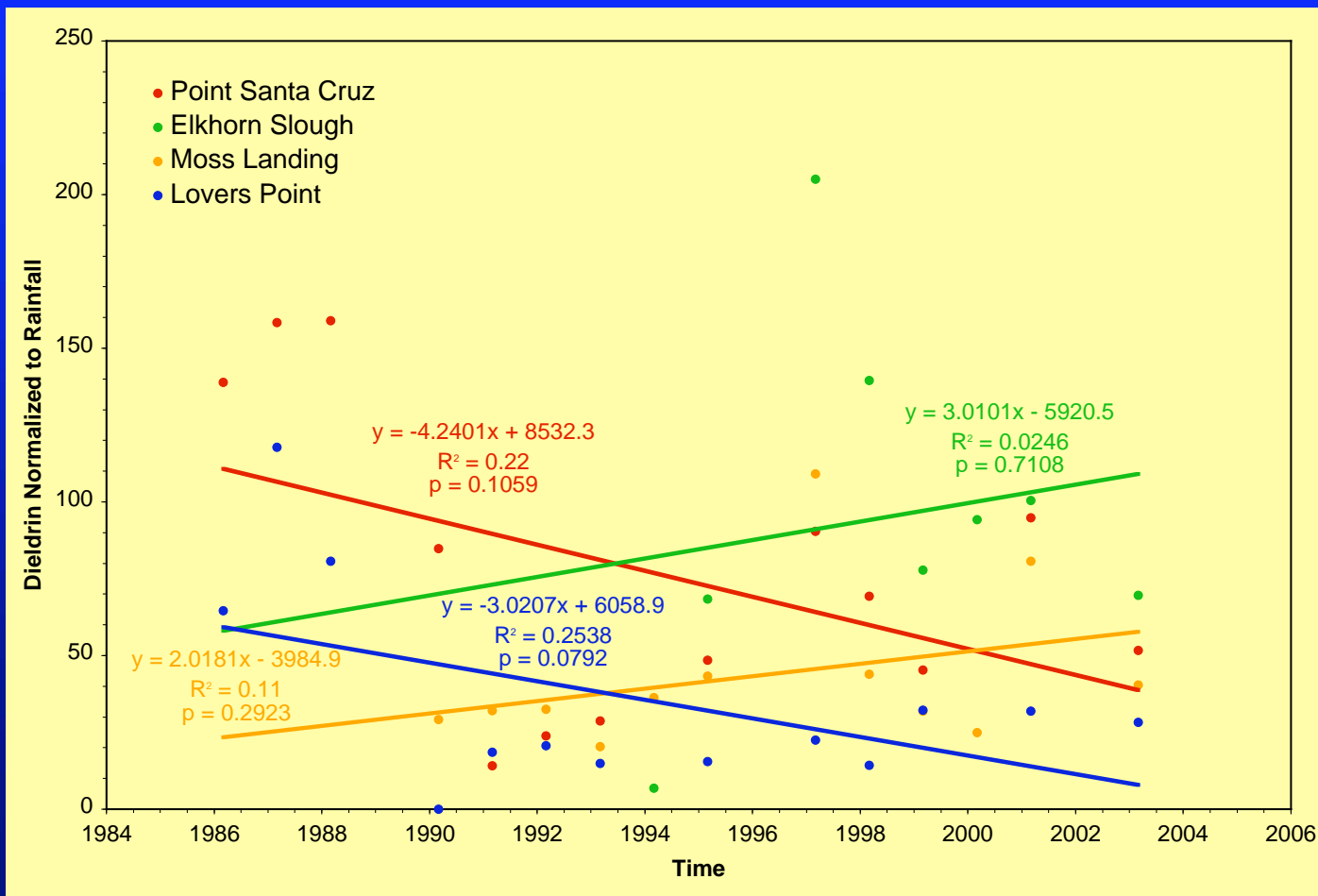
Diieldrin in Mussels vs. Time



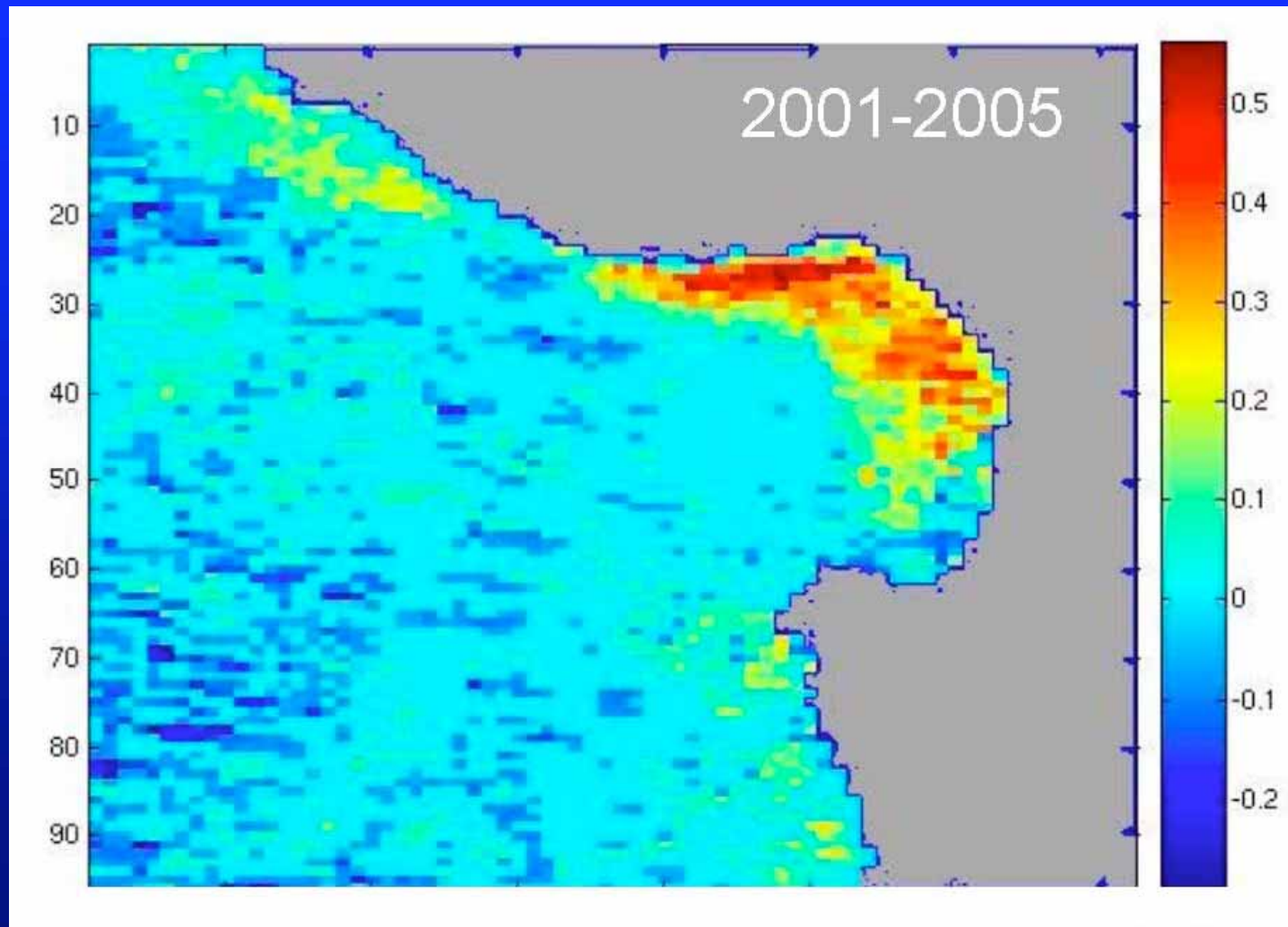
Dieldrin in Mussels vs. Rain



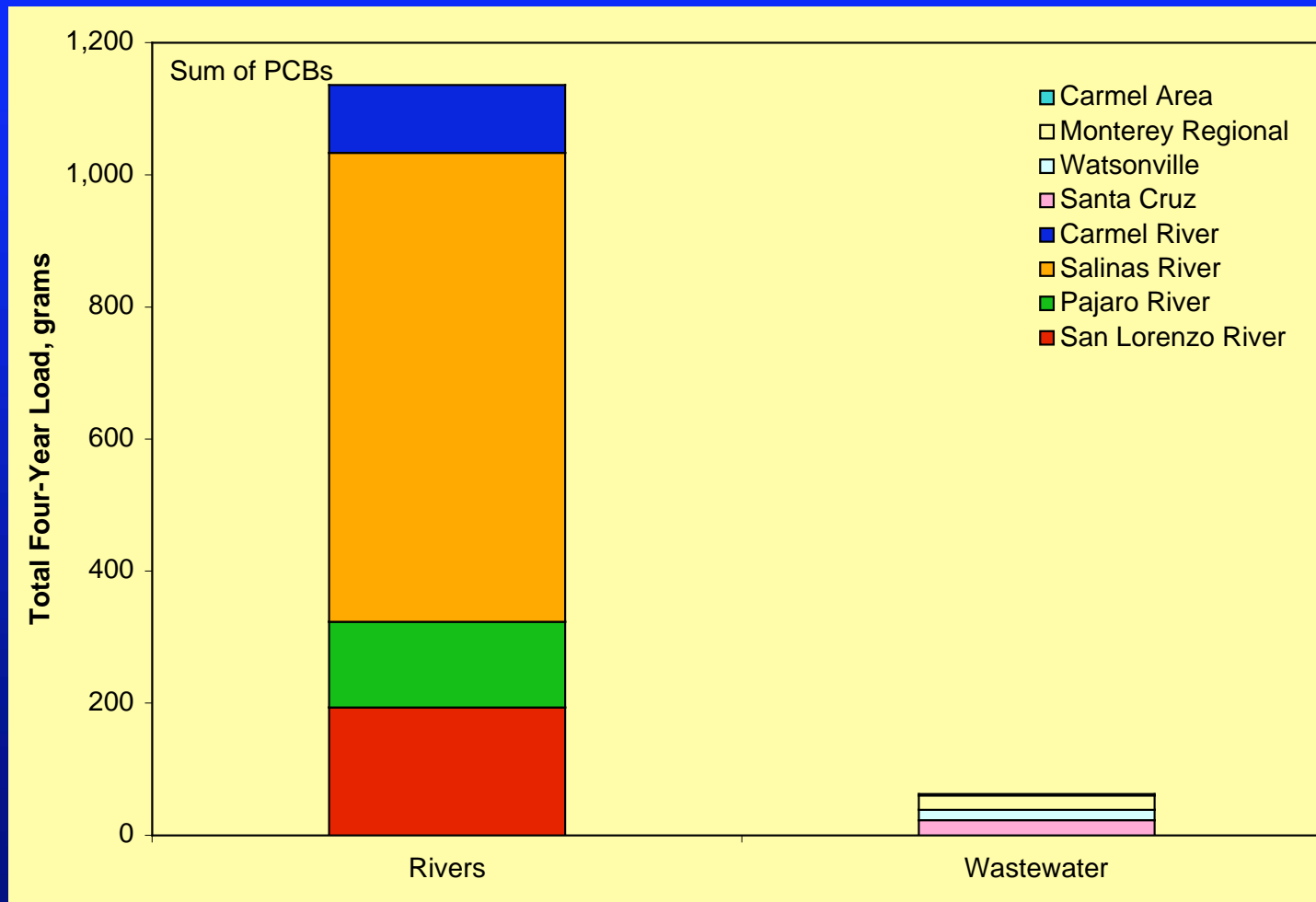
Dieldrin/Rainfall vs. Time



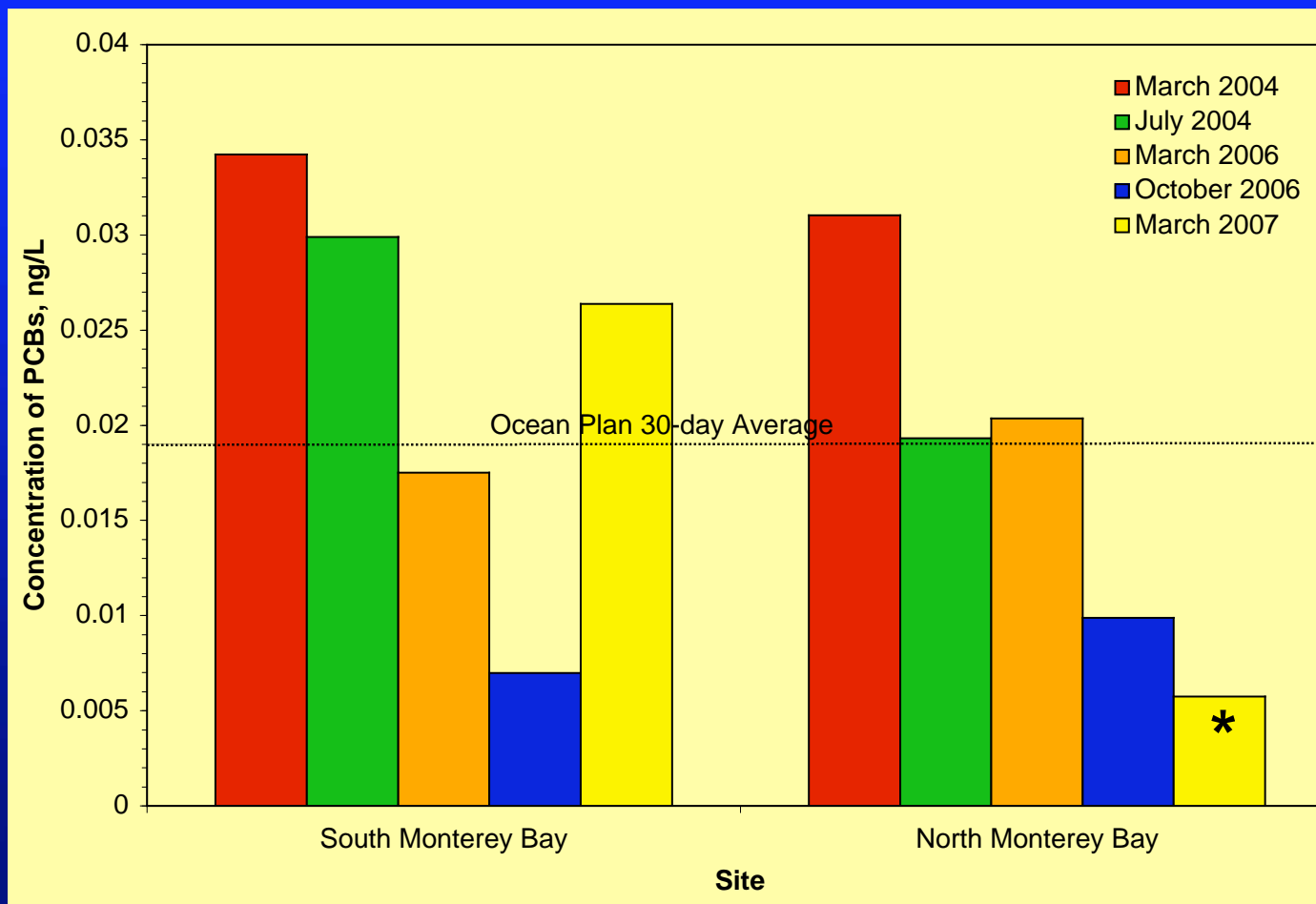
Storm Runoff to Mussels



PCB Sources and Loads



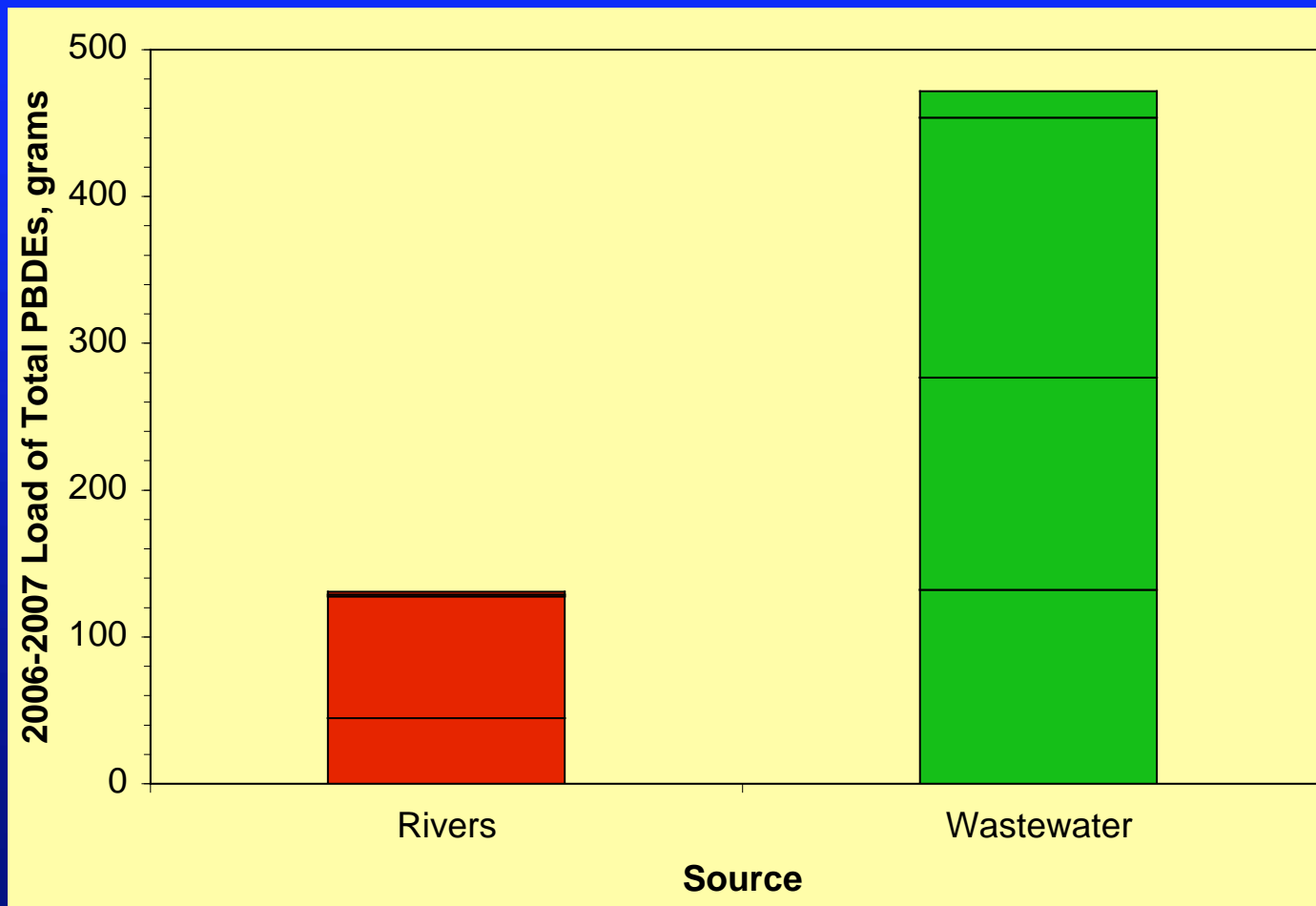
PCBs in Monterey Bay Water



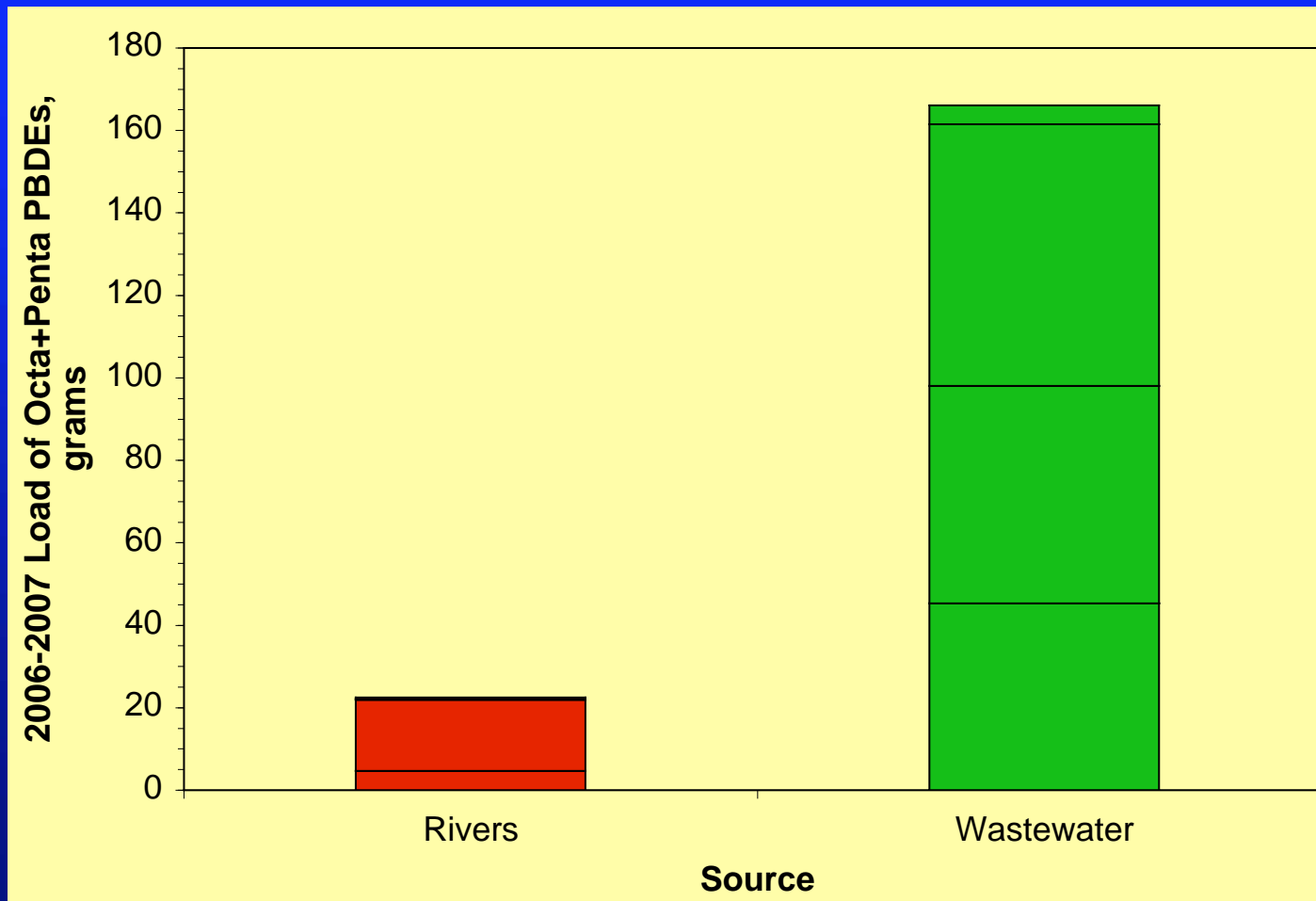
New Directions for CCLEAN

- Contaminants of emerging concern
 - Polybrominated Diphenyl Ethers (PBDEs)
 - Perfluorinated compounds (PFCs)
- Screening effluent for reproductive endocrine disruption
- Integrate ASBS stormwater dischargers

Sources of PBDEs



Banned PBDEs



Other Wastewater Discharges

Treatment Plant	Mean Flow, MGD	Mean Effluent PBDE Concentration, ng/L	% octa+penta -BDEs	Estimated Effluent PBDE Load, kg/year
Plant 1, SF Bay Area ¹	80	66	NA	7.3
Plant 2, SF Bay Area ¹	46	63	NA	4
Plant 3, SF Bay Area ¹	120	14	NA	2.4
Palo Alto ²	19	29	45	0.9
Santa Cruz	12.3	8.7	34	.13
Watsonville	7.6	15.5	36	.14
Monterey Regional	10.6	16.9	36	.18
Carmel Area	1.3	9.7	26	.018

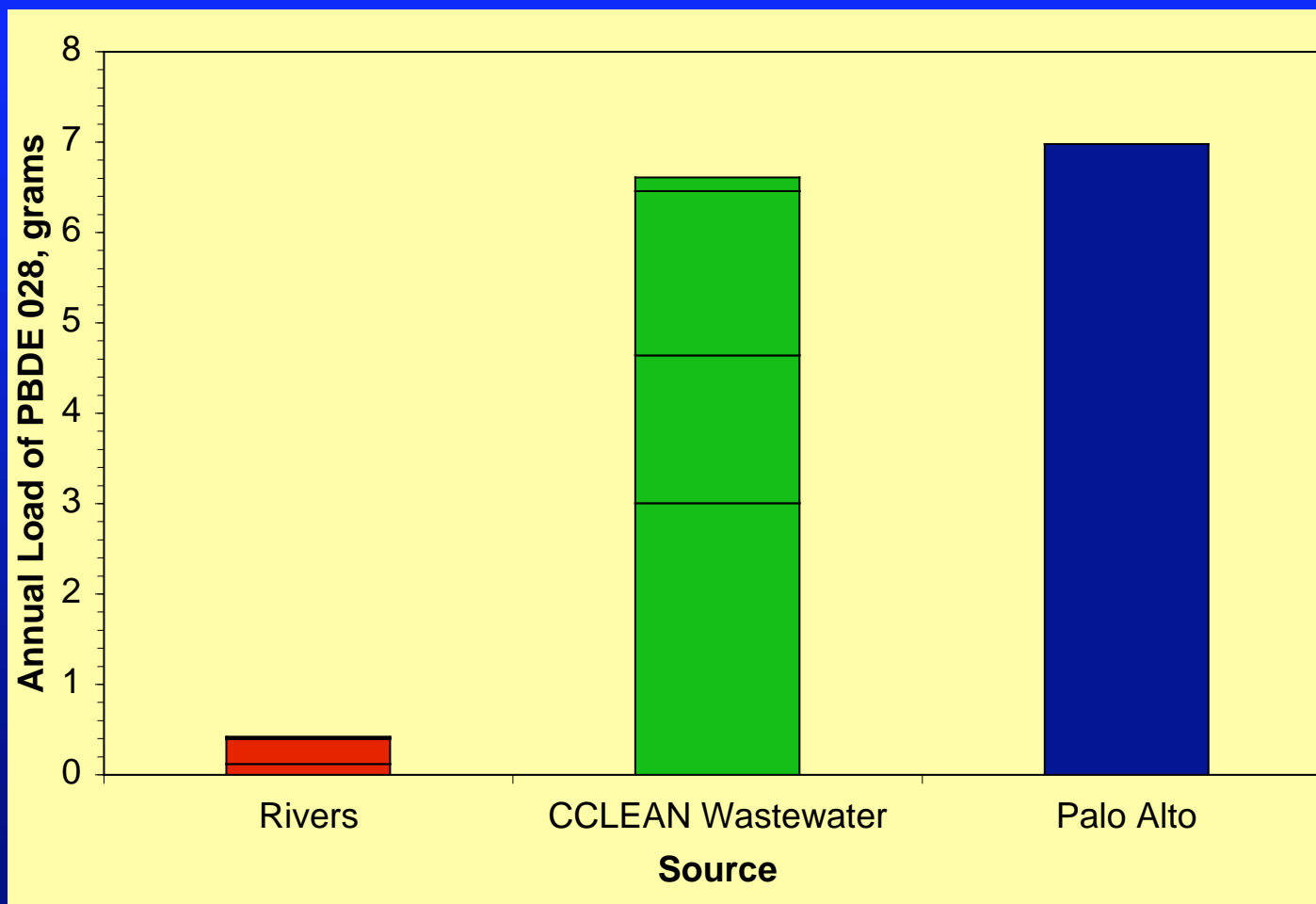
¹ = 2005 data from Petraes and Oros (2006).

² = Data from North (2004).

POPs in Sea Otters

- 230 otters with full necropsy data
- Some POPs were significant risk factors for otters dying from disease
 - PBDE 028 vs. protozoal infection
 - PBDE 028 vs. exposure to wastewater
- Other factors, such as age and nutritional condition were also significant risk factors for otters dying from disease.

Sources of PBDE 028



Major Findings

- Rivers are the largest measured source of most POPs
- Legacy contaminants are still entering Monterey Bay and impairing beneficial uses
- Contaminants of emerging concern are a serious issue
 - Different sources from legacy contaminants
- Loads of POPs from non-river urban sources unknown
- Keep sediment from washing into the ocean